Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Canceled)

2. (Currently Amended) ~~A system according to claim 1,~~ A motion control system comprising control logic and a programming interface, the programming interface being configured to permit a user to specify a plurality of non-tangential path segments, and the control logic being configured to generate a plurality of additional transitioning path segments substantially extending between the non-tangential path segments, wherein the control logic is configured to generate control signals to control operation of a plurality of motion axes to drive movement of a controlled element along a path defined by the non-tangential path segments and the additional transitioning path segments, wherein the control signals include position reference values, and wherein the control logic includes a plurality of interpolators configured to generate the position reference values substantially simultaneously along a plurality of different coordinate axes.

3. (Original) A system according to claim 2, wherein the plurality of interpolators are configured to generate the position reference values approximately once per update cycle for each of the plurality of different coordinate axes.

4. (Currently Amended) A system according to claim [[1]] 2, wherein each of the plurality of motion axes comprises a motor.

5. (Currently Amended) ~~A system according to claim 1,~~ A motion control system comprising control logic and a programming interface, the programming interface being configured to permit a user to specify a plurality of non-tangential path segments, and the control logic being configured to generate a plurality of additional transitioning path segments substantially extending between the non-tangential path segments, wherein the control logic is configured to generate control signals to control operation of a plurality of motion axes to

drive movement of a controlled element along a path defined by the non-tangential path segments and the additional transitioning path segments, wherein the plurality of path segments include a first path segment and a second path segment, wherein the first path segment and the second path segment are non-coplanar such that no plane exists which contains both the first path segment and the second path segment, and wherein the control logic is configured to generate a transitioning path segment that extends between the first path segment and the second path segment.

6. (Currently Amended) A system according to claim [[1]] 5, wherein the plurality of non-tangential path segments are specified in a plurality of respective user instructions, and wherein each instruction contains fields to permit the user to separately specify a maximum acceleration, maximum deceleration and maximum speed for the path segment.

7. (Currently Amended) ~~A system according to claim 1,~~ A motion control system comprising control logic and a programming interface, the programming interface being configured to permit a user to specify a plurality of non-tangential path segments, and the control logic being configured to generate a plurality of additional transitioning path segments substantially extending between the non-tangential path segments, wherein the control logic is configured to generate control signals to control operation of a plurality of motion axes to drive movement of a controlled element along a path defined by the non-tangential path segments and the additional transitioning path segments, wherein the programming interface is configured to permit the user to specify the plurality of non-tangential path segments in a first coordinate system, wherein the plurality of motion axes comprise a plurality of motors, wherein the plurality of motors define a second coordinate system which is different than the first coordinate system, and wherein the control logic includes coordinate transformation logic configured to perform coordinate transformations between the first coordinate system and the second coordinate system.

8. (Original) A system according to claim 7, wherein the control logic includes control logic configured to generate position reference values for use in controlling the plurality of motors, the position reference values including a first set of position reference corresponding to a first axis of the first coordinate system and a second set of position reference values corresponding to a second axis of the first coordinate system, and wherein the coordinate transformation logic transforms the first and second sets of position reference values for use in the second coordinate system.

9. (Currently Amended) ~~A system according to claim 1,~~ <u>A motion control system comprising control logic and a programming interface, the programming interface being configured to permit a user to specify a plurality of non-tangential path segments, and the control logic being configured to generate a plurality of additional transitioning path segments substantially extending between the non-tangential path segments, wherein the control logic is configured to generate control signals to control operation of a plurality of motion axes to drive movement of a controlled element along a path defined by the non-tangential path segments and the additional transitioning path segments, and</u> wherein the programming interface includes an instruction which permits the commanded path profile to be changed dynamically from a first path profile to a second path profile while the first path profile is being executed before a user-specified endpoint of the first path profile is reached.

10. (Currently Amended) ~~A system according to claim 1~~ <u>A motion control system comprising control logic and a programming interface, the programming interface being configured to permit a user to specify a plurality of non-tangential path segments, and the control logic being configured to generate a plurality of additional transitioning path segments substantially extending between the non-tangential path segments, wherein the control logic is configured to generate control signals to control operation of a plurality of motion axes to drive movement of a controlled element along a path defined by the non-tangential path segments and the additional transitioning path segments, and</u> wherein, during movement along the transitioning path segments, the controlled element transitions from the first user-

specified path segment to the second user-specified path segment without spikes in acceleration.

11. (Currently Amended) ~~A system according to claim 1,~~ A motion control system comprising control logic and a programming interface, the programming interface being configured to permit a user to specify a plurality of non-tangential path segments, and the control logic being configured to generate a plurality of additional transitioning path segments substantially extending between the non-tangential path segments, wherein the control logic is configured to generate control signals to control operation of a plurality of motion axes to drive movement of a controlled element along a path defined by the non-tangential path segments and the additional transitioning path segments, and wherein the programming interface is an object-oriented programming interface in which displayable objects are used to represent physical hardware and relationships between physical hardware.

12. (Currently Amended) ~~A system according to claim 1,~~ A motion control system comprising control logic and a programming interface, the programming interface being configured to permit a user to specify a plurality of non-tangential path segments, and the control logic being configured to generate a plurality of additional transitioning path segments substantially extending between the non-tangential path segments, wherein the control logic is configured to generate control signals to control operation of a plurality of motion axes to drive movement of a controlled element along a path defined by the non-tangential path segments and the additional transitioning path segments, and wherein the programming interface includes a jog block which permits the user via a jog instruction to specify a new velocity at which a shaft of a motor, a move block which permits the user via a move instruction to specify a new position for a shaft of a motor, a time cam block which permits a user via a time cam instruction to specify an axis position profile which specifies axis position as a function of time, a gear cam block which permits the user via a gear instruction to specify an electronic gearing relationship between the shaft of a motor and a shaft of another motor, and a position cam block which permits the user via a position cam instruction

to specify an axis position profile which specifies axis position for a shaft of a motor as a function of a position of the shaft of another motor.

13. (Currently Amended) A system according to claim [[1]] 2, wherein the system is an industrial control system.

14. (Currently Amended) ~~A system according to claim 1,~~ A motion control system comprising control logic and a programming interface, the programming interface being configured to permit a user to specify a plurality of non-tangential path segments, and the control logic being configured to generate a plurality of additional transitioning path segments substantially extending between the non-tangential path segments, and wherein the control logic is configured to generate control signals to control operation of a plurality of motion axes to drive movement of a controlled element along a path defined by the non-tangential path segments and the additional transitioning path segments,

wherein the programming interface permits the user to specify a merge type,

wherein, according to a first merge type, (1) any currently executing coordinated motion instructions involving the same specified coordinate system are terminated and prior motion is merged into the current move, and (2) any currently executing system single axis motion instructions involving any axes defined in the specified coordinate system are not affected, and

wherein, according to a second merge type, (1) any currently executing single axis motion instructions involving any axes defined in the specified coordinate system are terminated, (2) any currently executing coordinated motion instructions involving the same specified coordinate system are terminated, and (3) the prior motion is merged into the current move.

15. (Canceled)

16. (Currently Amended) ~~A method according to claim 15~~ A control method for controlling movement of a controlled element in a multi-dimensional coordinate system, the

multi-dimensional coordinate system being defined by at least first and second motion axes of a motion control system, comprising:

controlling movement of a controlled element along a first user-specified path segment, the first user-specified path segment being specified in one or more instructions in a user program;

controlling movement of the controlled element along a transition path segment, the transition path segment transitioning movement of the controlled element from a first trajectory along the first user-specified path segment to a second trajectory along a second user-specified path segment, the first and second trajectories having different orientations in the multi-dimensional coordinate system, and the transition path segment being generated by control logic and not being user-specified; and

controlling movement of the controlled element along the second user-specified path segment, the second user-specified path segment being specified by the one or more instructions in the user program; and

wherein, during movement along the transition path segment, the controlled element transitions from the first user-specified path segment to the second user-specified path segment without spikes in acceleration.

17. (Currently Amended) ~~A method according to claim 15,~~ A control method for controlling movement of a controlled element in a multi-dimensional coordinate system, the multi-dimensional coordinate system being defined by at least first and second motion axes of a motion control system, comprising:

controlling movement of a controlled element along a first user-specified path segment, the first user-specified path segment being specified in one or more instructions in a user program;

controlling movement of the controlled element along a transition path segment, the transition path segment transitioning movement of the controlled element from a first trajectory along the first user-specified path segment to a second trajectory along a second user-specified path segment, the first and second trajectories having different orientations in

the multi-dimensional coordinate system, and the transition path segment being generated by control logic and not being user-specified; and

controlling movement of the controlled element along the second user-specified path segment, the second user-specified path segment being specified by the one or more instructions in the user program; and

wherein the first user-specified path segment and the second user-specified path segment are located in different planes of a three dimensional space.

18. (Currently Amended) ~~A method according to claim 15,~~ A control method for controlling movement of a controlled element in a multi-dimensional coordinate system, the multi-dimensional coordinate system being defined by at least first and second motion axes of a motion control system, comprising:

controlling movement of a controlled element along a first user-specified path segment, the first user-specified path segment being specified in one or more instructions in a user program;

controlling movement of the controlled element along a transition path segment, the transition path segment transitioning movement of the controlled element from a first trajectory along the first user-specified path segment to a second trajectory along a second user-specified path segment, the first and second trajectories having different orientations in the multi-dimensional coordinate system, and the transition path segment being generated by control logic and not being user-specified; and

controlling movement of the controlled element along the second user-specified path segment, the second user-specified path segment being specified by the one or more instructions in the user program; and

wherein the transition path segment has a shape which is a circular segment.

19. (Original) A motion control system for controlling movement of a controlled element, the movement of the controlled element being driven by first and second motors, comprising:

a first interpolator, the first interpolator generating a first set of position commands to control operation of the first and second motors, the first set of position commands being configured to control movement of the controlled element in a direction that is tangential to a trajectory of the controlled element throughout movement of the controlled element; and

a second interpolator, the second interpolator generating a second set of position commands to control operation of the first and second motors, the second set of position commands being configured to control movement of the controlled element in a direction that is non-tangential to the trajectory of the controlled element throughout movement of the controlled element.

20. (Original) A motion control system according to claim 19, wherein the first and second interpolators operate substantially simultaneously.

21. (Original) A motion control system according to claim 19, further comprising a third interpolator, and wherein the first, second, and third interpolators operate along orthogonal axes.

22. (Original) A motion control system according to claim 19,

wherein the motion control system includes a programming interface that permits the user to specify a merge type,

wherein, according to a first merge type, (1) any currently executing coordinated motion instructions involving the same specified coordinate system are terminated and prior motion is merged into the current move, and (2) any currently executing system single axis motion instructions involving any axes defined in the specified coordinate system are not affected, and

wherein, according to a second merge type, (1) any currently executing single axis motion instructions involving any axes defined in the specified coordinate system are terminated, (2) any currently executing coordinated motion instructions involving the same specified coordinate system are terminated, and (3) the prior motion is merged into the current move.

23. (Currently Amended) A motion control system for controlling three-dimensional movement of a controlled element, the movement of the controlled element being driven by first, second, and third motors, comprising:

a first interpolator, the first interpolator generating a first set of position commands to control operation of the first, second, and third motors, the first set of position commands being configured to control movement of the controlled element in a direction of a first vector; [[and]]

a second interpolator, the second interpolator generating a second set of position commands to control operation of the first, second, and third motors, the second set of position commands being configured to control movement of the controlled element in a direction of a second vector;

a third interpolator, the third interpolator generating a third set of set of position commands to control operation of the first, second, and third motors, the third set of position commands being configured to control movement of the controlled element in a direction of a third vector; and

coordinate transformation logic, the coordinate transformation logic being configured to transform the first, second and third sets of source system position commands from a source coordinate system defined by a trajectory of the controlled element to a target coordinate system defined by first, second, and third motion axes;

wherein one of the first, second, and third vectors is tangential to a trajectory of the controlled element throughout movement of the controlled element, and wherein the remaining ones of the first, second, and third vectors are normal to the trajectory of the controlled element and normal to each other throughout movement of the controlled element.

24. (Canceled)

25. (Canceled)

26. (Canceled)